What is claimed is:

1. A Raman amplification pump module for outputting pump light for Raman-amplification of signal light propagating through an optical waveguide path, said module comprising:

5   a light source system for emitting light having two or more different output peak wavelengths; and

a nonlinear medium having an input port and an output port,

said nonlinear medium affording nonlinear effect on light emitted from said light source system and input from the input port, and outputting

10   the resultant light as pump light from the output port.

2. A Raman amplification pump module according to claim 1, wherein said light source system comprises:

two or more light sources for emitting light having different wavelengths; and

15   an optical multiplexer for multiplexing light from said light sources and outputting the multiplexed light,

at least one of said light sources being a high-output laser for outputting power capable of causing optical parametric effect.

3   A Raman amplification pump module according to claim 1, wherein

20   said light source system comprises:

two or more light sources for emitting light having different wavelengths; and

an optical multiplexer for multiplexing light from the light sources

and outputting the multiplexed light,

at least one of the light sources being a semiconductor laser without temperature adjusting means.

4.   A Raman amplification pump module according to claim 1, wherein said light source system has one multi-wavelength light source for oscillating at two or more different wavelengths.

5.   A Raman amplification pump module according to claim 1, wherein the channel spacing $\Delta\lambda$ of two output peak wavelengths satisfies the following relationship with respect to at least one set of combination out of the combinations of two output peak wavelengths discretionarily selected from said two or more output peak wavelengths:

$$\Delta\lambda \leqq \sqrt{\frac{\lambda_0 \gamma \ (P_1 + P_2 + 2\sqrt{P_1 P_2})}{\pi \ c|D|}}$$

where

λ_0 is the wavelength center of two output peak wavelengths,

γ and D represent a nonlinear coefficient and a chromatic dispersion at λ_0, respectively,

c represents light speed, and

P_1 and P_2 represent power at two output peak wavelengths, respectively.

6.   A Raman amplification pump module according to claim 1, wherein the channel spacing $\Delta\lambda$ is equal to or more than 2 nm with respect to at least one set of combination out of the combinations of two output peak wavelengths discretionarily selected from said two or more output peak

wavelengths.

7. A Raman amplification pump module according to claim 1, wherein
with respect to at least one set of combination out of the combinations of
two output peak wavelengths discretionarily selected from said two or
more output peak wavelengths, when viewed from one wavelength having
a larger power than the other wavelength, the other wavelength and the
zero dispersion wavelength of the nonlinear medium exist on the same
side.

8. A Raman amplification pump module according to claim 1, wherein
said nonlinear medium is an optical fiber.

9. A Raman amplification pump module according to claim 1, wherein the
relationship of the following formula is satisfied:

$\gamma / \alpha > 13 \ [1 / W / dB]$

where

the nonlinear coefficient of said optical fiber is $\gamma \ W^{-1}km^{-1}$, and

the transmission loss is α dB/km.

10. A broadband light source having an input port and output port and
comprising a light source system and a nonlinear medium, wherein said
light source system emits light having two or more different output peak
wavelengths, and

said nonlinear medium affords nonlinear effect on light input into the input

port from said light source system, and outputs the resultant light as pump

light from the output port.

11. A Raman amplifier for amplifying signal light propagating through an optical fiber, said amplifier comprising an optical fiber for Raman amplification, a multiplexing module, and a Raman amplification pump module,

5   said Raman amplification pump module comprising:

a light source system for emitting light having two or more different output peak wavelengths; and

a nonlinear medium having an input port and an output port,

said nonlinear medium affording nonlinear effect on light emitted from said

10   light source system and input from the input port, and outputting the resultant light as the pump light from the output port.